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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/918,463	08/01/2001	Yongju Jung	1567.1014	2888
49455	7590	12/01/2005	EXAMINER	
STEIN, MCEWEN & BUI, LLP 1400 EYE STREET, NW SUITE 300 WASHINGTON, DC 20005			DOVE, TRACY MAE	
			ART UNIT	PAPER NUMBER
			1745	

DATE MAILED: 12/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/918,463

Applicant(s)

JUNG ET AL.

Examiner

Tracy Dove

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,7-16,19,20,22,23,26 and 32-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,7-16,19,20,22,23,26 and 32-37 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

This Office Action is in response to the communication filed on 9/21/05. Applicant's arguments have been considered, but are moot in view of the new grounds of rejection. Claims 1, 3, 4, 7-16, 19, 20, 22, 23, 26 and 32-37 are pending. This Action is made FINAL, as necessitated by amendment.

#### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 3, 4, 6-11, 14, 15, 19, 20, 22, 23, 25, 26 and 32-35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claims 1, 19 and 33 recite the broad recitation "the weak polar solvent is selected from the group consisting of aryl compounds, cyclic or noncyclic ether compounds, and noncyclic carbonate compounds", and the claims also recites "the weak polar solvent comprises

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one solvent selected from the group consisting of xylene, dimethoxyethane, 2-methyltetrahydrofuran, diethyl carbonate, dimethyl carbonate, toluene, dimethyl ether and diethyl ether", which is the narrower statement of the range/limitation.

Furthermore, claim 3 improperly broadens claim 1. Similarly, claim 22 improperly broadens claim 19.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 4, 7-16, 19, 20, 22, 23, 26, 32, 33, 36 and 37 are rejected under 35 U.S.C. 102(b)/103(a) as being anticipated by, or alternatively unpatentable over, Evans et al., US 4,302,520.

Evans teaches an electrochemical cell comprising a solid cathode material, a lithium anode and an organic electrolyte. The solid cathode material includes metallic bismuth, metallic sulfur and metallic iron or lead. The electrolyte includes a mixed solvent and a solute (abstract). The cathode may include a conductive agent (2:20-21). The anode may comprise lithium or a

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lithium alloy (2:46-55). Preferred solvents for the electrolyte include sulfolane (strong polar), acetonitrile (strong polar), tetrahydrofuran (lithium protect), methyl tetrahydrofuran (weak polar), dioxolane (lithium protect), 3-methyl-2-oxazolidone (strong polar), propylene carbonate (strong polar), butyrolatone (strong polar), ethylene glycol sulfite (strong polar), dimethylsulfite (strong polar), dimethyl sulfoxide and dimethoxyethane (weak polar) (4:28-39). The best electrolyte solvent is a 3-methyl-2-oxazolidone (3M2O) based electrolyte. Low viscosity solvents may be used as cosolvents with the 3M2O solvent. The low viscosity solvents are listed at col. 4, lines 62-col. 5, lines 4. Example 1 teaches an electrolyte comprising a mixed solvent and a  $\text{LiCF}_3\text{SO}_3$  salt. The mixed solvent comprises dioxolane (lithium protect), dimethoxyethane (weak polar), 3M2O (strong polar) and dimethylisoxazole (lithium protect). Furthermore, Evans teaches at least seven of the members of the strong polar solvent Markush group as recited by the claimed invention. Also disclosed by Evans are at least two members of the weak polar solvent Markush group and at least two members of the lithium protection solvent Markush group as recited by the claimed invention. The electrolyte is a mixed solvent.

Thus the claims are anticipated.

The claims are alternatively unpatentable. Evans does not teach a specific example of the claimed mixed organic solvents. However, Applicant's own disclosure teaches that 3-methyl-2-oxazolidone may be used as the strong solvent. The claims have been amended to delete "3-methyl-2-oxazolidone" (3M2O) merely to try to overcome the prior art of record. No support is found in the specification for the deletion of 3M2O. Applicant's invention does not disclose any rationale for the deletion of 3M2O or why 3M2O could not function as the strong polar solvent. Furthermore, the courts have ruled that by the presentation of a Markush group for the strong

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polar solvents, Applicant has made the representation that for the purpose of the present invention, the elements of the group are equivalents. Having made this representation, Applicant may not now argue that these two elements are not equivalents. In re Skoll, 187 USPQ 481 (CCPA 1975). Thus, the invention would have been obvious to one of skill because 3M2O is considered equivalent to the strong polar solvents recited by the claimed invention.

\*

Claims 1, 3, 4, 7-11, 19, 20, 22, 23, 26, 32, 33 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vourlis, US 5,432,030.

Vourlis teaches a lithium/FeS<sub>2</sub> rechargeable electrochemical cell comprising an electrolyte including a solvent mixture of 3-methyl-2-oxazolidone (strong polar), 1,3-dioxolane (lithium protect) and 1,2-dimethoxyethane (weak polar) with a LiCF<sub>3</sub>SO<sub>3</sub> salt. See abstract. FeS<sub>2</sub> is a sulfur based compound comprising an iron additive. The anode may contain lithium or a lithium alloy (3:42-45). The cathode may contain a conductive material and a binder (Ex. 1). The cathode material is coated on a current collector (Ex. 4). The cathode may contain In<sub>2</sub>S<sub>3</sub>, Pb<sub>3</sub>O<sub>4</sub> or TiS<sub>2</sub> (1:47-50).

Vourlis does not explicitly teach the strong polar solvent, as currently claimed.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Applicant's own disclosure teaches that 3-methyl-2-oxazolidone may be used as the strong solvent. The claims have been amended to delete "3-methyl-2-oxazolidone" (3M2O) merely to overcome the prior art of record. No support is found in the specification for the deletion of 3M2O. Applicant's invention does not disclose any rational for the deletion of 3M2O or why 3M2O could not function as the strong

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polar solvent. Furthermore, the courts have ruled that by the presentation of a Markush group for the strong polar solvents, Applicant has made the representation that for the purpose of the present invention, the elements of the group are equivalents. Having made this representation, Applicant may not now argue that these two elements are not equivalents. *In re Skoll*, 187 USPQ 481 (CCPA 1975). Thus, the invention would have been obvious to one of skill because 3M2O is considered equivalent to the strong polar solvents recited by the claimed invention.

\*

Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vourlis, US 5,432,030 or Evans et al., US 4,302,520 in view of Katz et al., US 6,358,643.

See discussion of Vourlis and Evans above.

Neither Vourlis nor Evans teaches the porosity of the positive electrode.

However, the claimed invention would have been obvious to one having ordinary skill in the art at the time the invention was made because Katz teaches in a liquid electrolyte lithium-sulfur battery it is generally desirable that the positive electrode have a relatively high porosity, possibly as high as 95% or more. Generally, higher porosity electrodes allow fabrication of cells with higher laminate energy densities because less electronic conductor is required. Of course, an electrode's porosity, capacity and thickness are linked so that setting two of these parameters fixes the other. The courts have ruled where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Swain et al.*, 33 CCPA 1250, 156 F.2d 239, 70 USPQ 412. Furthermore, the courts have ruled that discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA

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1977). Katz teaches the electrode porosity, capacity and thickness can be varied to reach a desired electrode structure. Varying the porosity of the sulfur cathode of Vourlis or Evans is considered within the skill of one having ordinary skill in the art.

***Response to Arguments***

Applicant's arguments filed 9/21/05 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

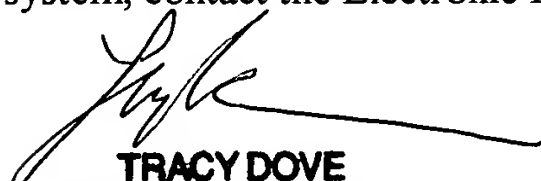
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



**TRACY DOVE**  
**PRIMARY EXAMINER**

November 25, 2005